

**CLAIMS**

1. An isolated and purified protein or polypeptide, characterized in that it is the S protein having the  
5 sequence SEQ ID No: 3, its ectodomain or a fragment of its ectodomain.
2. The protein or polypeptide as claimed in claim 1, characterized in that it consists of the amino acids  
10 corresponding to positions 1 to 1193 of the amino acid sequence of the S protein.
3. The protein or polypeptide as claimed in claim 1, characterized in that it consists of the amino acids  
15 corresponding to positions 14 to 1193 of the amino acid sequence of the S protein.
4. The isolated protein or polypeptide as claimed in claim 1, characterized in that it consists of the amino  
20 acids corresponding to positions 475 to 1193 of the amino acid sequence of the S protein.
5. A nucleic acid encoding a protein or a polypeptide as claimed in any one of claims 1 to 4.  
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6. The nucleic acid as claimed in claim 5, characterized in that it comprises the sequence encoding SEQ ID No: 5 or the sequence encoding SEQ ID  
30 No: 6.
7. A recombinant expression vector, characterized in that it encodes a protein or a polypeptide as claimed in any one of claims 1 to 4.
- 35 8. The recombinant expression vector as claimed in claim 7, characterized in that it is chosen from the vectors contained in the following bacterial strains,

deposited at the Collection Nationale de Cultures de Microorganismes (CNCM), 25 rue du Docteur Roux, 75724 Paris Cedex 15:

- a) strain No. I-3118, deposited on October 23, 2003,
- 5 b) strain No. I-3019, deposited on May 12, 2003,
- c) strain No. I-3020, deposited on May 12, 2003,
- d) strain No. I-3059, deposited on June 20, 2003,
- e) strain No. I-3323, deposited on November 22, 2004,
- f) strain No. I-3324, deposited on November 22, 2004,
- 10 g) strain No. I-3326, deposited on December 1, 2004,
- h) strain No. I-3327, deposited on December 1, 2004,
- i) strain No. I-3332, deposited on December 1, 2004,
- j) strain No. I-3333, deposited on December 1, 2004,
- k) strain No. I-3334, deposited on December 1, 2004,
- 15 l) strain No. I-3335, deposited on December 1, 2004,
- m) strain No. I-3336, deposited on December 1, 2004,
- n) strain No. I-3337, deposited on December 1, 2004,
- o) strain No. I-3338, deposited on December 2, 2004,
- p) strain No. I-3339, deposited on December 2, 2004,
- 20 q) strain No. I-3340, deposited on December 2, 2004,
- and
- r) strain No. I-3341, deposited on December 2, 2004.

9. A nucleic acid containing a synthetic gene  
25 allowing optimized expression of the S protein in eukaryotic cells, characterized in that it possesses the sequence SEQ ID No: 140.

10. An expression vector containing a nucleic acid as  
30 claimed in claim 9, characterized in that it is contained in the bacterial strain deposited at the CNCM, on December 1, 2004, under the No. I-3333.

11. The expression vector as claimed in claim 7 or  
35 claim 9, characterized in that it is a viral vector, in the form of a viral particle or in the form of a recombinant genome.

12. The vector as claimed in claim 11, characterized in that it is a recombinant viral particle or a recombinant viral genome capable of being obtained by transfecting a plasmid according to paragraphs g), h) or k) to r) of claim 8, into an appropriate cellular system.

13. A lentiviral vector encoding a polypeptide as claimed in any one of claims 1 to 4.

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14. A recombinant measles virus encoding a polypeptide as claimed in any one of claims 1 to 4.

15. A recombinant vaccinia virus encoding a polypeptide as claimed in any one of claims 1 to 4.

16. The use of a vector according to paragraphs d) to p) of claim 8, or of a vector as claimed in claim 10, for the production, in a eukaryotic system, of the SARS-associated coronavirus S protein or of a fragment of this protein.

17. A method for producing the S protein in a eukaryotic system, comprising a step of transfecting eukaryotic cells in culture with a vector chosen from the vectors contained in the bacterial strains mentioned in paragraphs d) to p) of claim 8, or in claim 10.

18. A genetically modified eukaryotic cell expressing a protein or a polypeptide as claimed in any one of claims 1 to 4.

19. The cell as claimed in claim 18, capable of being obtained by transfection with any one of the vectors mentioned in paragraphs k) to n) of claim 8.

20. The cell as claimed in claim 19, characterized in that it is the cell FRhK4-Ssol-30, deposited at the CNCM on November 22, 2004, under the No. I-3325.

5 21. A monoclonal antibody recognizing the native S protein of a SARS-associated coronavirus.

22. The use of a protein or a polypeptide as claimed in any one of claims 1 to 4, or of an antibody as  
10 claimed in claim 21, for detecting a SARS-associated coronavirus infection, from a biological sample.

23. A method for detecting a SARS-associated coronavirus, from a biological sample, characterized in  
15 that the detection is carried out by ELISA using the recombinant S protein or its ectodomain, or a fragment of its ectodomain, expressed in a eukaryotic system.

24. The method of detection as claimed in claim 23,  
20 additionally comprising a step of detection by ELISA using the recombinant N protein.

25. The method as claimed in claim 23 or 24, characterized in that it is a double epitope ELISA  
25 method, and in that the serum to be tested is mixed with the visualizing antigen, said mixture then being brought into contact with the antigen attached to a solid support.

30 26. An immune complex formed of a monoclonal antibody or antibody fragment as claimed in claim 21, and of a SARS-associated coronavirus protein or peptide

27. An immune complex formed of a protein or a  
35 polypeptide as claimed in any one of claims 1 to 4, and of an antibody directed specifically against an epitope of the SARS-associated coronavirus.

28. A SARS-associated coronavirus detection kit or box, characterized in that it comprises at least one reagent selected from the group consisting of: a protein or polypeptide as claimed in any one of  
5 claims 1 to 4, a nucleic acid as claimed in either of claims 5 and 6, a cell as claimed in any one of claims 18 to 20, or an antibody as claimed in claim 21.

29. An immunogenic and/or vaccine composition,  
10 characterized in that it comprises a recombinant protein or polypeptide as claimed in any one of claims 1 to 4, obtained in a eukaryotic expression system.

30. An immunogenic and/or vaccine composition,  
15 characterized in that it comprises a recombinant vector or virus as claimed in any one of claims 7, 8, and 10 to 15.

31. A nucleic acid insert of viral origin,  
20 characterized in that it is contained in any one of the strains mentioned in paragraphs a) to h) and k) to r) of claim 8.